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ABSTRACT

This study investigated the earliest manifestations of verb tense and agreement in English-speaking children, using longitudinal data on the language of four children aged 1:6 to 3:5 years, drawn from a child-language database. Analysis focused on one aspect of inflectional phrase (IP), the children's use of the verbs "be" and "do" forms to mark agreement, and the ending "-ed" and instances of "did" as tense markers. Results show that tense and agreement do not emerge simultaneously, and furthermore, that there is a specific sequence in order of acquisition across English-speaking children: namely, tense appears before agreement. Findings are considered in the context of several approaches to language acquisition and current theories of syntactic structure. It is concluded that: (1) results provide empirical support for the syntactic structure of the language and in particular, the split-inflectional hypothesis, and (2) among current approaches to language acquisition, the continuity hypotheses lend themselves best to interpretation of these results. (MSE)

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The Structure of IP: Evidence from Acquisition Data

Monica Malamud Makowski

ED 375 663

I examine the earliest manifestations of tense and agreement in English-speaking children. To the extent that the acquisition of these elements reflects the development of the corresponding syntactic projections, this can shed light on the nature of phrase structure. Using longitudinal data from four children in the CHILDES database, I focus on their use of *be* and *do* forms to mark agreement and the ending *-ed* and instances of *did* as tense markers. This study shows that tense and agreement do not emerge simultaneously. Furthermore, the data strongly suggest that there is a specific sequence in the order of acquisition across English-speaking children, namely, tense appears before agreement. The results are considered in the context of several approaches to language acquisition and current proposals for syntactic structure.

1. INTRODUCTION

1.1. Overview

In the literature we find reference to IP (inflection phrase) as a maximal projection, within which Infl represents a cluster of features, such as Agreement, Tense, Negation, Aspect. However, Pollock (1989) and Chomsky (1991) have proposed that each one of the features traditionally found under Infl is actually the syntactic head of its own maximal projection. In this paper, I will study the acquisition of Tense and Agreement in monolingual children learning English. The main purpose of this study is to find out what the developmental sequence of tense and agreement markers is. Additionally, the results can be related to two important theoretical issues:

a. the structure of IP, and

b. the process whereby adult syntax is attained.

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In other words, we would like to find out whether language acquisition data can provide evidence for the structure of IP, and to see whether the acquisition of specific syntactic material might shed some light on the nature of phrase structure development in general.

The structure of this paper is as follows. The introduction gives some background on the syntactic and language acquisition theories that are relevant for this paper, as well as a review of related studies in acquisition. Section 2 describes the data sources used in this study, and the methodology for analyzing them. In the next four sections, the data corresponding to the acquisition of tense and agreement markers for four children is analyzed. This analysis shows that, for the children studied, the realization of tense precedes that of agreement, as summarized in section 7. Finally I discuss the results obtained here within the context of different theoretical approaches to language acquisition, and speculate on the possible relation between my findings and syntactic structure.

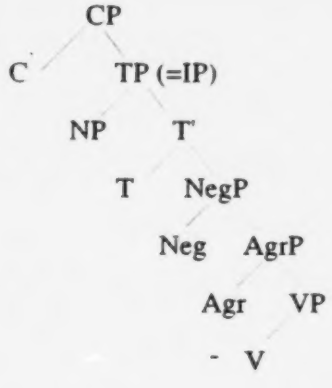
In the remainder of the introduction I first summarize Chomsky's (1991) and Pollock's (1989) proposals for phrasal structure with respect to the status of tense and agreement. Then, I present the three main approaches within which language acquisition data is currently being interpreted. Lastly, I briefly review acquisition studies of tense and agreement, and contrast their methodology with the one used here.

1.2. **The Split-infl hypothesis**

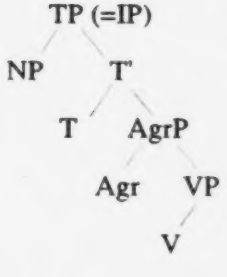
Although several recent studies (Radford 1990; Clahsen, Parodi and Penke 1992; Vainikka 1992) recognize the existence of various features within IP, they treat these features as components of IP, but do not suggest that they might be maximal projections in their own right. For example, Radford (1990) lists the infinitival *to*, modals, auxiliaries *be*, *do* and *have*, forms of the copula *be*, (Simple Present) 3rd person singular *-s* and past tense *-ed* as INFL-material in English. This suggests that (at least) agreement, tense and aspect features occur in INFL.

Pollock (1989) argues that IP should not be considered as a cluster of features, but instead proposes that it be replaced by the maximal projections AgrP (agreement phrase), TP (tense phrase) and NegP (negation phrase) for French and English. He provides abundant evidence for his proposal from verb movement in tensed and tenseless clauses, the position of adverbs and quantifiers, and the behavior of modals. He attributes the differences between French and English to the characteristics of agreement morphology in the two languages. The tree he proposes for English is shown in (1.a), and the sub-tree that contains the structural elements that are relevant for this paper in (1.b):

(1) a.



b.



Chomsky's (1991) proposal differs from Pollock's in that he postulates the existence of two kinds of Agr: Agr-S (a subject-agreement element) and Agr-O (an object-agreement element). Although both Pollock and Chomsky posit an AgrP immediately above the VP, it is important to note that, in Pollock's case, this phrase contains Agr (a subject-agreement

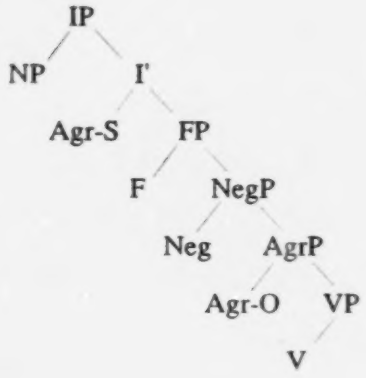
element), whereas in Chomsky's tree the AgrP is the maximal projection that corresponds to Agr-O. Therefore, in the structure proposed by Chomsky, Agr-O is closer to the verb, while Agr-S is outside of the TP (labeled FP, for finite phrase), thus closer to the subject.

Chomsky's analysis of the IP is reproduced in (2.a). In (2.b) only those elements that are significant for this study are shown. In particular, Agr-O is omitted because it is not morphologically realized in English; we are only concerned with overt mainfestations (i.e., subject-agreement) here.

Comparing (1.b) and (2.b), it is now easy to see that the main difference between Chomsky's and Pollock's analyses lies in the relative ordering of Tense and Agr[1].

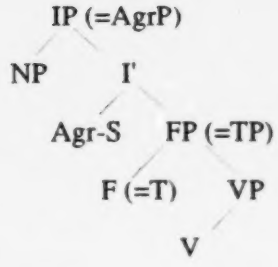
Both Chomsky and Pollock provide different types of data in support for their analyses. Acquisition data is a potential source of evidence for these analyses as well. In this paper, I will examine the acquisition of tense and agreement markers in monolingual English-speaking children. If children were to acquire tense and agreement at different times consistently, this could constitute further evidence for the split-infl hypothesis.

(2) a.



[1] As mentioned before, Agr-O is not lexically realized in English. As the emphasis here is on overt markers, Agr-O will not be discussed in this paper. Thus, Agr-S will be the only type of agreement examined, and in order to keep the notation consistent with most authors', it will be referred to as AgrP.

b.



1.3. **Phrase structure development**

The aim of this paper is not only to provide a descriptive account for what is observed in child language, but also to explain the findings from a theoretical perspective. Both theories and hypotheses need to be constantly confronted with the data, so they can be either ratified, rectified or refuted. Since this is a study of the acquisition of phrase structure elements, it would be appropriate to examine the results under the light of the different theoretical frameworks that have been proposed for the acquisition of syntax. Let us now briefly review the current approaches to language acquisition.

Not all researchers agree as to how phrase structure reaches the adult form. There is an on-going debate in the field of language acquisition among those that claim that the child's grammar is identical to the adult's from the very beginning, and those who argue that it is only a reduced version of the fully-developed grammar. One of the aims of this study is to shed some light on this debate, by considering whether the results are consistent with the predictions of the different theories.

Three different hypotheses have been proposed in order to account for the syntactic aspect of language acquisition:

a. the maturational approach,

b. the strong continuity hypothesis, and

c. the weak continuity hypothesis.

The main difference among them is whether the full tree is present from the beginning of language acquisition or not. For those theories that assume the latter, an additional

difference is how they account for the acquisition of the adult tree. An outline of the three theoretical positions is given here.

According to the Maturational Approach (Radford 1990; Ouhalla 1991), children start off with a tree that lacks functional projections. They are acquired at later developmental stages as determined by maturational (genetic or biological) factors.

The Strong Continuity Hypothesis (Weissenborn 1990, Boser et al. 1992) holds that phrase structure does not develop. Under this approach, the full adult tree, with all its functional projections, is present from the beginning of language acquisition. In particular, Poeppel and Wexler (1993) present evidence from word-order to argue for the existence of inflectional and complementizer systems in young children, based on production data from a German-speaking 25-month-old child; they propose what they refer to as the Full Competence Hypothesis, a concept analogous to the Strong Continuity Hypothesis. As functional categories are assumed to be in place even before they are lexicalized, the fact that some functional material might not appear in early child language is attributed to other factors, such as constraints on processing capabilities, or a limited vocabulary. Valian (1992), for example, proposes that the child fails to lexically realize certain elements or perform transformations (such as movement of constituents) in an effort to reduce the cognitive costs associated with speaking.

The Weak Continuity Hypothesis (Clahsen, Eisenbeiss and Vainikka in print, Vainikka 1992) assumes, like the maturational approach, that children's early grammars are not adult-like, but differs in its account for the acquisition of functional projections. It is through the interaction between Universal Grammar (more specifically, the principles of X' theory) and the input, that the child discovers and posits the existence of new functional projections. Therefore, both the weak and the strong continuity hypotheses share the assumption that UG is available to the child at the beginning of language acquisition, but the weak continuity hypothesis posits only the structure that is necessary to account for the production data at each stage in development.

In summary, the three current approaches to language acquisition differ on two dimensions: the state of the child's grammar at the beginning of language acquisition, and the way in which the child's grammar moves from one stage to the next. These differences affect the predictions that each theory makes. In section 8, the results of this study are analyzed under the different approaches, in order to test whether their predictions hold.

Researchers have looked at the acquisition of tense and agreement in the past. Let us now review the earlier studies, so as to be able to compare the methodology and results with the study reported here.

1.4. **Early studies of the acquisition of tense and agreement**

In a classic longitudinal study of the speech of three English-speaking children, Adam, Eve and Sarah, Brown (1973) described the acquisition of fourteen morphemes. Some of the morphemes that Brown examined are also analyzed in this paper. However, the present study differs from Brown's in its methodological approach.

Brown (1973) scored and ordered the fourteen morphemes in terms of the acquisition criterion defined by Cazden (1965), according to which the point of acquisition is "the first speech sample of three, such that in all three the inflection is supplied in at least 90% of the contexts in which it is clearly required" (p. 435). Based on the results of his study, Brown concluded that "the developmental order of the fourteen morphemes is quite amazingly constant" (p. 272) and that "while order of development approaches invariance, rate of development varies widely" (p. 273).

A similar study was conducted by Jill and Peter de Villiers (1973). Instead of being longitudinal, like Brown's, theirs was a cross-sectional study of the acquisition of the same 14 morphemes in 21 children aged 1;4-3;4. The results were comparable to those obtained by Brown and provide additional support for his conclusions.

Among the fourteen morphemes examined by Brown, those that are directly relevant to the present study are the regular past tense (*-ed*), and contractible and uncontractible copula

and auxiliary *be*. In particular, Brown ordered the regular past tense before the contractible copula and auxiliary and the uncontractible auxiliary for all three children. In addition, in the case of Eve, the regular past tense was acquired before the uncontractible copula as well. It should be pointed out, however, that except for the uncontractible copula in Adam's and Sarah's speech, and the regular past tense in Eve's, none of the other morphemes had attained Brown's acquisition criterion by the time the children entered into stage V (MLU = 4).

Although Brown's data seem to suggest that the acquisition of the past tense in general precedes the acquisition of agreement markers (manifested in the different forms of the copula and auxiliary *be*), his data are not conclusive, since it is unclear when the criterion is actually met. His ordering of the morphemes not yet acquired by stage V is based on the percentages of the morphemes supplied in obligatory contexts in the last six hours of recordings. Although he hypothesizes that this order "probably corresponds quite closely with the order of ultimate acquisition" (p. 272), he also states that "there is always a considerable period, varying in length with the particular morpheme, in which production-where-required is probabilistic" (p. 257). Therefore, if the time that elapses between emergence and acquisition is variable for different morphemes, then the actual order of acquisition (by the 90% criterion) cannot be predicted from the ordering of intermediate percentages.

To illustrate this point, consider the development of the prepositions *in* and *on* in Eve's early samples: *on* is supplied in 10%, 50% and 40% of the obligatory contexts in samples 1, 2 and 3 respectively, whereas *in* is supplied for the first time in 17% of obligatory contexts in sample 3; contrary to what these percentages would seem to predict, *in* attains the 90% level before *on* (p. 263).

1.5. Early manifestations of tense and agreement vs. mastery

Brown was able to determine the order of acquisition of fourteen English morphemes based on a 90% criterion. He did not make reference to the time when these morphemes first appeared in the children's speech, and this cannot be inferred from the final ordering. In particular, the example in 1.4 clearly shows that emergence and full acquisition can occur at significantly different times. More importantly, it demonstrates that time of emergence is not an accurate predictor for time of mastery (and vice versa), because the period of time that separates them is not constant.

Yet another problem that arises when acquisition is equated with mastery, as in Brown's and de Villiers and de Villiers' studies, is that, from the perspective of syntactic development, it is very difficult to account in terms of phrase structure for the period of time that follows emergence and preceeds mastery. Brown determined the point when the child mastered a given morpheme. In the present study, in contrast, I concentrate on the early manifestations of tense and agreement, or emergence (as defined in section 2.3), rather than on mastery. I think that the emergence of a marker is already revealing some change in the phrase structure of the child's grammar. This is an important methodological difference between the current study and the ones described above.

A review of Brown's work on the acquisition of tense and agreement markers has motivated the need for a study that determines the point of emergence rather than mastery. The purpose of this study is to determine whether there are differences in the time that tense and agreement markers are acquired[2], and if so, whether the developmental sequence is constant for various children. If this turns out to be the case, then the empirical results could contribute towards the understanding of two theoretical issues:

a) they could be interpreted as an additional piece of evidence for the split-infl hypothesis (outlined in section 1.2); and

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[2] From now on, whenever 'acquisition' and 'acquire' are used, they should be understood as 'emergence' and 'emerge' (as defined in section 2.3).

b) they can be used to verify if the predictions of the different theories of language acquisition summarized in section 1.3 hold.

The next section starts with a description of the raw data used in this study. Some of these data actually come from part of Brown's corpora. Next, the procedure for identifying relevant data (i.e., tense and agreement markers) is explained. Finally, the two acquisition criteria that serve as the basis for the data analysis are defined.

2. METHODOLOGY

2.1. Data

The data used in the present study come from the CHILDES database. The data analyzed here correspond to the transcripts from four different children: Naomi, Nina, Adam and Eve. Table 1 shows the files used, the age range for each child in those files, and who was responsible for the data collection.

Name	Files	Age (yr;mo)	Collected by
Naomi	3-89	1;8 -3;5	Jacqueline Sachs
Nina	1-36	1;11-2;10	Patrick Suppes
Adam	1-30	2;3 -3;4	Roger Brown
Eve	1-20	1;6 -2;3	Roger Brown

Table 1

Naomi's data were collected at irregular intervals. Some files are only one day apart, while others differ by up to two weeks. The data collection was more frequent at the age of 1;10-1;11, with a total of 26 files (#9-#34). There are 14 files (#35-#49) in her corpus for

the period between 2;0 and 2;1. Outside of the age range 1;10-2;1, data collection was much less frequent.

Nina's corpus consists of three to four monthly transcripts. Files #24-26, around age 2;4-2;5, were not available for this study. The only noticeable break in the data collection occurs between files #31 and #32, when there is a gap of three and a half months between ages 2;5 and 2;9. Adam's and Eve's samples were collected at very regular intervals, every two weeks.

2.2. **Procedure**

2.2.1. **Agreement markers**

Agreement may have different realizations across languages, and even within the same language. In English, for example, the forms of the verb *be* indicate agreement, as well as the ending *-s* in the third person singular of the Simple Present tense.

In this study, I concentrate on the forms of the verb *be* that are used contrastively to show agreement, because they are the earliest agreement markers to appear. However, in my analysis I excluded contracted forms, imitations and formulaic expressions, for the reasons explained below.

I only consider forms that are not contracted to the subject, since when the child uses contracted forms there is no way to determine whether s/he is analyzing them into constituent parts (pronoun/noun + verb) or not. Contracted forms might be learned as a single lexical item. According to Radford (1990), "there is universal agreement among child language researchers that the clitic copula *'s* definitely does not function as a finite tense/agreement inflection in early child English sentences such as [*What's that?, Where's Mommy, Here's baby* ...]" (p. 166). Although *'s* will eventually become part of a fully developed inflection system, in the early stages it should not be interpreted in this way. The evidence that Radford provides in support of this claim can be summarized as follows:

1. children do not attach an *'s* productively to other verbs in order to mark third person singular present tense;
2. *s*-forms alternate with *s*-less forms, that is, the same child produces alternatively *What's that?* and *What that?*;
3. *'s* is the only form of the copula used at the beginning; until *is/am/are/'m/'re* appear, there is no reason to believe that *'s* is indeed denoting inflection;
4. *there's* is followed not only by singular complements, but by plural complements as well;
5. *'s* is only attached to inanimate and locative pronouns.

In summary, in early child speech *'s* appears only in utterances of the form *What/that/it/where/there('s) + NP*.

I also exclude imitations of previous adult utterances, since in these cases it is not possible to tell whether the child's utterance would have been produced spontaneously or not. In this case there are two possible interpretations: what the child produces in the imitation could be solely the result of his/her syntactic competence, or his/her imitation ability could enhance the quality of language production. When a recorded session starts with a child's utterance, this sentence is excluded as well, because it could have been an imitation of an unrecorded adult utterance.

In addition, I ignore formulaic expressions such as *there you are, here it is* and *how are you?*, which do not show productive use of the language. Therefore, they cannot be considered a reliable source of the child's syntactic competence.

Although I focus on the forms of *be*, I consider the use of *does* as an additional agreement marker. A preliminary analysis of the data showed that *does* appears relatively early in development, before the third person singular *-s*. (Since the ending *-s* was not present in the language of the children studied until much later, its use is not reported here.) A possible explanation for this might be that *does* appears before Present Tense *-s* endings because of its saliency, especially in the case yes/no questions. Being a combination of

several phonemes, *does* in questions and negatives may be more easily perceived by the child than the third singular *-s* in affirmative statements, which can be manifested as /*s*/, /*z*/ or /*iz*/[3].

2.2.2. **Tense markers**

The use of the past tense ending *-ed* is the main criterion for determining the acquisition of tense. Although past tense surfaces in different ways in irregular forms, these are not considered because they do not show productive use of the language on the part of children. In other words, it cannot be determined if an irregular past tense verb is analyzed as such by the child or not. *Do*-support errors reported by Stromswold (1990), seem to indicate that at the early stages of acquisition children store verbs with irregular past tense endings as a unit in their lexicon. Therefore, they produced double-tensing errors involving *did(n't)* plus an irregular past tense verb[4].

Irregular verbs that are used as if they were regular by children are included in the analysis. The over-generalization of the past tense marker in fact constitutes the best proof that the child is applying some rule to indicate tense, since the incorrect regular form of an irregular verb could not have been heard before. Additionally, instances of *did(n't)* are also taken as evidence that the child is beginning to acquire tense.

So far, we have specified what kind of markers will be extracted from the raw data in order to study the development of tense and agreement. The next step is to define the criteria that will be used so as to identify the different developmental stages, based on the data described in section 2.1. This is done in the following section.

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[3] As we will see later (section 8.1), the order of acquisition of the markers observed here does not correlate with phonological saliency.

[4] However, in an experiment of grammaticality judgement, questions that had either one of the two tense markers (whether on the auxiliary or on the main verb) were judged "to be equally good and significantly better than questions that had neither tense marker [...] or both ..." (Stromswold 1990, p. 19). As a result, Stromswold regards double-tensing as a production error, not as lack of knowledge of a tense marking rule that could be stated as "a sentence must have only one tense marker."

2.3. **Criteria for acquisition**

I consider that markers for tense or agreement have emerged when there is at least one semantically appropriate example in two consecutive files used in spontaneous speech, outside of formulaic expressions. In addition, more than one form of *be* must be present in the child's speech by this time. Applied to tense, this constraint would require that *-ed* be attached to more than one verb. Instead of crediting the child with the acquisition of tense and agreement markers the first time one such marker is used, I require that there be an opposition of form and function, to insure that the markers are really being used to deliberately express something[5].

Tense and agreement are considered as having emerged when the child provides enough evidence of their realization. It is important to point out that in order to credit the child with the emergence of a functional category, mastery of the paradigm is not required. What matters is that the child is trying to communicate something new. The inconsistency and errors of the earlier stages merely indicate that there is a time lag between emergence and mastery.

Apart from the emergence criterion, the acquisition of tense and agreement is determined in terms of a productivity criterion. Productive use of a tense or agreement marker is evident when there is a drastic increase in the frequency of use.

In the next four sections, the data corresponding to the four children are examined. The development of tense and agreement markers is outlined for each one of them, illustrated with transcriptions of their utterances and tables that show the frequency of use of the markers studied. The criteria defined in this section are used as quantitative measures to determine the stages that the children's language goes through.

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[5] This method of analysis is also used by Schylter (1990) in her study of the acquisition of tense and aspect in bilingual children. She states that "the fact that the child uses a certain verb form does not necessarily mean that the grammatical category represented by this form has been acquired" (p. 92). For this reason, she cosiders that a category is (on the way to being) acquired only "where form and function are used by the child in a systematic relation to each other, and preferably in opposition to other forms/functions" (p. 92).

3. NAOMI

3.1. Agreement

Until file #22 (1;11), the only form of *be* that Naomi uses is *is*. From #23 (1;11) to #52 (2;3), she starts to use *are*, but most of the time in imitations and formulaic expressions. Moreover, in some instances *are* is not used correctly (that is, it does not agree with the subject). Apart from these, the only other examples are shown in (3):

(3) a. *The stars are running.* (#23 - 1;11)

b. *Where are we going?* (#46 -2;1)

In (3.a) the semantic content of the sentence is unclear. In the wh-question in (3.b), the inclusion of *are* might be due to the interpretation of the transcriber (in rapid adult speech, *where are* and *where* could be indistinguishable). Since these are not clear examples of the use of *are* and the emergence criteria is not met, I cannot say that agreement has emerged in the speech of Naomi yet.

From files #53 (2;3) to #65 (2;6), *are* is used occasionally, as shown in (4).

(4) a. *What are you doing with it?*

You are tired?

You are crying? (#53 - 2;3)

b. *My hands are dirty.* (#54 - 2;3)

c. *What are we having?* (#55 - 2;3)

d. *Those are my things.*

You are not warm enough. (#62 - 2;5)

e. *Those are mine.* (#63 - 2;5)

f. *Where are we going?*

Are we going to Michelle's? (#65 - 2;6)

The sentences in (4) show that from file #53 (2;3) on, *are* is used to mark agreement with different subjects (*you, we, those, my hands*). Since semantically appropriate examples are found in two consecutive files (#53 and #54), this is the point when the agreement marker can be said to emerge.

More forms of *be* appear from #66 (2;6) on, as shown in (5) and, at the same time, the frequency of usage increases significantly, as shown in Table 2.

(5) a. *I am at the Grandmother's house.* (#66 - 2;6)

b. *That boy isn't laughing.* (#68 - 2;7)

	Files	*is*	*are*	*am*	Forms of *be*
	41-45	11	2	0	13
	46-50	13	2	0	15
	51-55	9	5	0	14
	56-60	12	0	0	12
	61-65	11	7	0	18
2;6 ->	66-70	66	16	1	83
	71-75	30	3	1	34
	76-80	68	27	0	95

Table 2

According to these results, agreement becomes productive in Naomi's speech at age 2;6 (#66).

The use of *does/n't* is much less frequent in general, but a similar pattern can be observed (see Table 3), though somewhat delayed with respect to the use of forms of *be* to

mark agreement. Up to file #41, Naomi uses *do* only, usually with the verbs *like* and *want*. The only examples found before file #70 are listed in (6) below.

	Files	*Do/n't*	*Does/n't*
	41-45	3	1
	46-50	17	1
	51-55	27	0
	56-60	12	1
	61-65	31	0
	66-70	48	2
2;9 ->	71-75	34	10
	76-80	52	6
	81-85	97	10

Table 3

(6) a. *Does he hear me?* (#42 - 2;0)

b. *It doesn't yell the flower.* (#47 - 2;1)

c. *This doesn't taste good.* (#60 - 2;4)

Starting on #70 (2;8), there are still not too many examples of *does/n't*, but, nevertheless, they are used a few times in almost every file.

3.2. **Tense**

Tense clearly appears in file #20 (1;10). Some early examples are listed in (7):

(7) a. *I throweded it.*

I throwed it. (#20 - 1;10)

b. *I pushed it/that.* (#21 - 1;11)

-ed is used with a variety of verbs (*pushed, dropped, finished, closed, cleaned, snapped, bumped, turned, happened*), showing that these forms are not just specific items Naomi learned. In addition, she uses *-ed* with irregular verbs very often: *throwed, throweded, doed, eated, flied, crasheded, drawed, finded, jump overed* (also *jumped over*), *goed, maked, getted, teared, teareded, writted, rided, beed, bented, stinged, holded, babysitted.* She could not have heard these words in adult speech, which shows that she is indeed generalizing the application of a rule.

Did also comes in at age 1;10 (#20). Although it is not as frequent as the *-ed* marker, it is nevertheless used correctly from the beginning. In earlier files Naomi uses it especially to state *I did it.* But more variety is found later, as exemplified in (8):

(8) a. *Where did it go?* (#23 - 1;11)

b. *Did Daddy fall down?* (#30 - 1;11)

c. *Did kangaroo fall down?* (#31 - 1;11)

d. *Where did boy go?* (#45 - 2;1)

e. *What did Mommy say?*
What did Todd eat? (#51 - 2;2)

Both the *-ed* marker and *did* are used frequently as soon as they emerge (Table 4). Therefore, emergence and productivity coincide in time in this case.

Interestingly enough, in file #62 (2;5) Naomi produces a couple of sentences in which *did* is used emphatically:

(9) a. *I stepped on it. I did step on it.*

b. *I jumped over it. I did jump over it.*

This can be interpreted as clear evidence that not only does Naomi consider both *-ed* and *did* as past tense markers, but she also knows that their use is mutually exclusive (i.e., that tense can only attach to one item per clause).

	Files	*-ed*	*did*	total
	10-14	0	0	0
	15-19	0	0	0
1;10 ->	20-24	13	14	27
	25-29	7	4	11
	30-34	19	9	28
	35-39	17	1	18

Table 4

3.3. **Summary**

The analysis of Naomi's corpus reveals that tense marking first appears in file #20 (1;10), both in its *-ed* and *did* manifestations, and is productive right from the onset. The use of different forms of *be* to mark agreement, on the other hand, does not emerge until file #53 (2;3), and can be said to become productive only in file #66 (2;6).

4. NINA

4.1. Agreement

In Nina's early transcripts (up to age 2;4), *is* is used much more frequently than *are* (see (10) for an exhaustive list of utterances that include *are*). Up to file #23 (2;4) most of the examples of *are* occur in conjunction with the word *those* (10.a, c, d, f, g, h). Given that *those are* appears to be a semi-formulaic expression in Nina's speech, these sentences will not be considered. In (10.e) she does not use *are* correctly; at the same time, she seems to be experimenting with different forms of the verb *be*, unsure of which is the correct one.

(10) a. *Those are feet.* (#1 - 1;11)

b. *Cows are mine.* (#2 - 1;11)

c. *Those are egg.* (#6 - 2;0)

d. *Those are window.* (#10 - 2;1)

e. *There's are only people daddy. That's only people daddy.* (#14 - 2;2)

f. *Those are my ears.* (#14 - 2;2)

g. *Those are fences. Those are my valentines.* (#16 - 2;3)

h. *Those are eggs.*
And those are trees too. (#17 - 2;3)

i. *What are you doing, Mommy?* (#18 - 2;3)

j. *Where are you going, Nina?* (#20 - 2;4)

From files #18 to #23 Nina continues to use *are* mainly in the construction *those are*, but she starts to use it in other contexts as well (10.i and j). However, these examples still do not meet the emergence criterion, because they do not occur in consecutive files. Summarizing, the examples in (10) do not constitute clear enough evidence that the agreement paradigm has emerged in Nina's speech.

Based on the available data, it is not until file #27 (2;5) that the emergence criterion is met (11). As files #24-#26 were not available for this study, it is not possible to determine if the criterion was actually met slightly earlier. However, considering that the data in files #23 and #27 were collected when Nina was 2;4.26 and 2;5.24 respectively, it is quite safe to assume that the missing files correspond to age 2;5. Therefore, regardless of whether the emergence criterion is actually met in file #24, #25, #26 or #27, emergence will be assumed to take place at age 2;5.

(11) a. *These legs are sharp too.* (referring to toy reindeer)
I am a Nina. (#27 - 2;5)

b. *Some (bugs) are nice and dangerous.*
And dogs are animals.
Horsies are running. (#28 - 2;5)

c. *Her Mommy and a XXX are going to eat in a plate.*
Here, see all the things are mine. (#29 - 2;5)

	Files	*is*	*are*	*am*	Forms of *be*
	18-20	21	2	0	23
	21-23	4	0	0	4
	24-26	N/A	N/A	N/A	N/A
	27-29	30	7	1	38
	30-32	35	16	0	51
2;9 ->	33-35	117	43	2	162
	36-38	100	43	2	145

Table 5

As shown in Table 5, there is a noticeable increase in the use of forms of *be* starting with file #33 (2;9). This suggests that this type of agreement marker is entering the productive stage.

With respect to the forms *does/n't*, there are no appropriate uses before file #15 (2;2). Only two examples are found around this time (12.a and b). It is only a couple of months later that new examples of *does/n't* are found in Nina's transcripts (12.c and d).

(12) a. *A nose. Where does that go?* (#15 - 2;2)

b. *Which color does the daddy like?* (#17 - 2;3)

c. *This doesn't open. It doesn't work.* (#28 - 2;5)

d. *It doesn't bend.*

Doesn't come out?

Does the baby sleep in there? (#29 - 2;5)

	File	*do/n't*	*does/n't*
	28*	13	2
	29*	25	4
	30*	25	0
	31*	20	0
	32	6	0
2;9 ->	33	10	13
	34	11	13
	35	16	3
	36	22	15

* many agreement errors

Table 6

However, up to file #32 (2;9) Nina is still not contrasting *do* vs. *does* to mark agreement, and she still produces incorrect instances such as **he don't*...(see Table 6). Suddenly, in file #33 (2;9) Nina starts to alternate between *does/n't* and *do/n't* correctly. There is only one agreement error in files #33-36, which shows that the error rate is less than 1%.

4.2. Tense

In file #10 the first example of the past tense marker *-ed* occurs (13.a). Nina could not have heard the form *seed*, so she might be using some knowledge of how past can be marked in order to produce it. However, since this is an isolated example, the emergence criterion is not met yet. The next example of *-ed* is found in file #13, at age 2;2 (see 13.b). As this is followed by other semantically appropriate examples in the next file (see 13.c), the past tense marker *-ed* can be said to emerge at age 2;2.

(13) a. *I seed you.* (#10 - 2;1)

b. *I stayed down on it.* (#13 - 2;2)

c. *It's a bow. I tied it.*

What happened to part of the zoo?

(looking for a "part" to build a zoo) (#14 - 2;2)

From file #14 (2;2) on Nina produces many more examples of the *-ed* marker: *jumped, cried, wanted, scared, played, picked, scratched, nipped, climbed, shampooed, falled down*. As a consequence, the *-ed* marker can be said to have reached the level of productivity.

The earliest files in which *did* occurs are #13-14 (2;2); Nina repeats (14.a) twice and (14.b) four times.

(14) a. *He did run away.* (#13 - 2;2)

b. *Who did that?* (#14 - 2;2)

The next examples of *did/n't* appear in file #22 (2;4), at which time she starts producing these forms with increasing frequency (Table 7) and their use seems to be productive.

	File	*did/n't*
	13-15	6
	16-18	0
	19-21	0
2;4 ->	22-27	6
	28-30	11
	31-33	19
	34-36	27

Table 7

4.3. **Summary**

Based on Nina's transcripts, the *-ed* tense marker emerges in file #13 (2;2), and is used productively from file #14 (2;2) on. The use of *did* seems to emerge around the same time, but the productive stage is not reached until later. In comparison, the evidence from the use of different forms of *be* indicates that agreement does not emerge until age 2;5. The increase in the use of forms of *be* as an agreement marker also coincides with the time when the contrast *does* vs. *do* is correctly used (#33 - 2;9).

5. ADAM

5.1. Agreement

Excluding imitations and formulaic expressions, Adam uses *is* as the only form of *be* up to file #15 (2;10), except in the sentences listed in (15). Of these, only (13.e) is a good example of the use of *are* marking agreement. However, Adam uses only *is* in the transcripts corresponding to the next two months (#11-#14). Therefore, the examples in (15) do not meet the emergence criterion.

(15) a. Adam: *Up dere. Come. Come here. Come here [#] racket [?] you are. You naughty are.*

Mother: *"You naughty are"?*

Adam: *No. Mommy [#] are.* (#7 - 2;6)

b. *What are the seal doing?* (#7 - 2;6)

c. *Dis? Dey are two them. Adam did.*

Tatoo man miss it. (#9 - 2;7)

d. *Dig it. Look how are dig that. Dig a ground.* (#10 - 2;7)

e. *They are working.* (#10 - 2;7)

It is not until file #15 (2;10) that we find more evidence for agreement, when Adam uses *am* for the first time (16.a). This is followed by another semantically appropriate example in the next file (16.b).

(16) a. *I am burn no more.* (#15 - 2;10)

b. Ursula: *Who's Ursula?*

Adam: *You are.* (#16 - 2;10)

It is also at age 2;10 that an increase in the use of the forms of *be* can be observed (Table 8). After file #15 (2;10), Adam starts to use *are* with a variety of subjects in every file: *you, those, these* and *they* are the first ones (#16-#19), followed by others later on.

	File	*is*	*are*	*am*	Forms of *be*
	11-12	24	0	0	24
	13-14	26	0	0	26
2;10 ->	15-16	52	2	1	55
	17-18	31	21	0	52

Table 8

As for the *do* vs. *does* contrast, it seems to mark agreement in Adam's speech beginning on file #11, at age 2;8 (see 17.a), but according to our emergence criterion, agreement would emerge at age 2;9 (17.b and c):

(17) a. *Saggy baggy doesn't eat a XXX all up.*
Holler doesn't fit in there. (#11 - 2;8)

b. *It fits. It fit, does it? Does it?*
Trailer doesn't fit in there. (#13 - 2;9)

c. *Ricky does.*
Doesn't work? (#14 - 2;9)

Although the contrast between *do* and *does* meets the emergence criterion one month earlier than the forms of *be*, there is a three-month gap (#15 - #21) in the data until *does/n't* are used again, and their productivity is not evident till even later (Table 9). It should be pointed out that before *do* and *does* are productively contrasted, *do* is used very frequently

in what appear to be formulaic expressions in Adam's speech (*How do you know that?* and *do + want*).

	File	*do/n't*	*does/n't*
	11-12	53	2
	13-14	24	5
	15-16	84	0
	17-18	91	0
	19-20	171	0
	21-22	140	4
	23-24	115	1
	25-26	85	2
3;3 ->	27-28	96	40
	29-30	85	43

Table 9

5.2. Tense

In files #5 (2;5) and #7 (2;6) Adam produces examples of *-ed*, but they are all imitations. The first spontaneous example is found in file #9 (2;7), and at this time he starts to use a few verbs in the past tense in almost every file (18).

(18) a. *Dropped it cowboy. Drop cowboy knee.*
(meaning: I dropped the scissors on the cowboy's knee) (#9 - 2;7)

b. *Drop a rocket. Dropped a rocket.*
(after throwing a box, pretending it is a rocket)
Dropped. Where go? (in response to: What happened to the taxi wheels?)

What happened me? (#11 - 2;8)

c. *Coffee down. Stirred it.* (#12 - 2;8)

Did trickles in from file #3 (2;4) on. Some of the early examples are listed in (19). As (19.c) and (19.d) are examples of semantically appropriate uses in two consecutive files (#7 and #8), they mark the emergence of past tense. Suddenly, in file #9 (2;7), Adam produces a total of 24 sentences containing *did*, all of which correctly relate to past events.

(19) a. *Adam did that.* (#3 - 2;4)

b. *Did he?* (#5 - 2;5)

c. *What did you did?*

Who did? (#7 - 2;6)

d. *Who did that?* (#8 - 2;6)

5.3. **Summary**

Although Adam begins to mark past tense in file #3 (2;4), according to the specified criteria, past tense emerges in file #7 (2;6) and becomes productive in file #9 (2;7). Agreement markers, on the other hand, appear three months later. Taking the evidence from the forms of *be* and *do* together, agreement would emerge around file #13 (2;9) and reach the productive stage in file #15 (2;10).

6. **EVE**

6.1. **Agreement**

Contrary to what was observed in the other children, the first form of *be* reported in Eve's transcripts is *are* (20). As it is not possible to determine if *are* is indeed marking

agreement with a plural subject (*fish* can be either singular or plural), this example will not be considered.

(20) *Fish are swimming.* (#1, #8)

In file #9 (1;10), both *am* and *are* are used correctly, as shown in (21.a and b). Up to this point, Eve still produces incorrect examples such as (21.c).

(21) a. Mother: *What are you doing?*
Eve: *What am I doing?* (#9 - 1;10)

b. *Where are you?* (#9 - 1;10)

c. *That are hot.* (#11 - 1;11)

From file #12 (1;11) on, she consistently indicates agreement with the different forms of *be* that she uses (22). A couple of months later (age 2;1), these forms become more frequent in her speech (Table 10).

(22) a. *Is that hot?*
Those are my mitten. (#12 - 1;11)

b. *What is that Fraser?*
This is my big bibby.
What is name?
(meaning: what is the name of this soup?)
What are you doing? (#13 - 2;0)

	File	*is*	*are*	*am*	Forms of *be*
	7-8	0	1	0	1
	9-10	1	1	1	3
	11-12	5	3	0	8
	13-14	10	2	0	12
2;1 ->	15-16	28	6	1	35
	17-18	56	12	1	69
	19-20	43	17	2	62

Table 10

Does/n't as an agreement marker in contrast with *do/n't* meets the emergence criterion slightly earlier than the forms discussed above (#10 - 1;10). However, there are comparatively much fewer occurrences (see (23) for an exhaustive list).

(23) a. *That my scissor. Doesn't work.* (#10 - 1;10)

b. *Yours on the table. That doesn't write.* (#11 - 1;11)

c. *And so does Helga.* (#17 - 2;2)

d. *He doesn't have eyes.*

Because she doesn't want it. (#18 - 2;2)

e. *What does it have?* (#20 - 2;3)

6.2. **Tense**

As far as tense is concerned, the first instance of *-ed* occurs at age 1;8 (24.a), followed by examples in every file from file #7 (1;9) on. (24.b) and (24.c) suggest that tense emerges at age 1;9.

(24) a. *Somebody tored it.* (#5 - 1;8)

b. *Pulled Timmy.* (in response to: What did Lassie do?) (#7 - 1;9)

c. *You put milk in. Spilled the milk.* (telling mother she spilled milk)
All wiped up. Milk all wiped up. (#8 - 1;9)

A month later, Eve starts using the *-ed* marking more productively, with examples in every file (Table 11). She attaches *-ed* not only to regular verbs (*pulled, wiped, happened, sharpened*), but also to irregular verbs (*falled, goed, doed*). The latter examples constitute good evidence that she is indeed applying a rule to generate the past tense of a verb.

	File	*-ed*
	1-2	0
	3-4	0
	5-6	1
	7-8	5
1;10 ->	9-10	12
	11-12	3
	13-14	14
	15-16	12
	17-18	10

Table 11

Eve's use of *did/n't* does not add anything to what has been said with respect to tense marking. She produces the first two examples at age 2;0 (25), followed by others from file #16 (2;1) on.

(25) *Fraser did it.*

You didn't have much noodle. (#13 - 2;0)

6.3. Summary

In Eve's transcripts, agreement emerges at age 1;10 (#10) and becomes productive three months later (#15), whereas tense emerges at age 1;9 (#7) and displays productivity by 1;10 (#9). In short, whether the emergence or the productivity criterion is used, tense appears earlier than agreement in Eve's speech.

7. SUMMARY OF RESULTS

Researchers studying functional categories in child language acquisition have normally assumed that the order of emergence mirrors the hierarchical organization of functional elements in syntactic structure. This is sometimes based on the chronological order of appearance of the constituents or processes under investigation (Clahsen 1990; Meisel and Müller 1992, Penner 1992). It is unquestionable that the acquisition of new syntactic elements causes a cluster of changes in the language of the child, regardless of whether these changes are interpreted as building new structure or filling existing slots. However, it is not the case that all of the possible changes occur simultaneously. For this reason, this study was designed in an attempt to determine the order of emergence of tense and agreement by looking at the earliest manifestations of the corresponding markers to surface in child language.

Table 12 summarizes the results of this study. For each child, the age of acquisition of tense and agreement using the emergence criterion is given, followed by the age of acquisition according to the productivity criterion (in parentheses).

	Naomi	Nina	Adam	Eve
Tns	1;10 (1;10)	2;2 (2;2)	2;6 (2;7)	1;9 (1;10)
Agr	2;3 (2;6)	2;5 (2;9)	2;9 (2;10)	1;10 (2;1)

Table 12

Emergence (and productivity) of tense and agreement markers

In the first place, the results obtained show that tense and agreement do not emerge simultaneously. In addition, for all four children studied, it is clear that the realization of tense precedes agreement marking. The data strongly suggest that there is a specific sequence in the order of acquisition (as determined by the emergence and productivity criteria) that is constant across individuals: tense appears before agreement in the grammar of English-speaking children.

8. DISCUSSION

8.1. Possible non-syntactic determinants of acquisition order

Before discussing the results from a syntactic point of view, it is interesting to consider whether there might be some other factors that influence the order of emergence of tense and agreement markers[6].

According to Radford (1992), a "factor that might determine the relative order of acquisition of functors is their relative complexity. [...] However, given that English is a language in which finite forms have a highly impoverished inflectional morphology, [...] there is no obvious reason to suppose that T, Agr and C should not be acquired more or less at the same stage of development" (p. 34). Later he concludes that "given that we

[6] It should be pointed out that the present study only included English-speaking children. Thus, the discussion will be limited to English, unless otherwise stated.

could find no evidence for claiming that any one of the three relevant functors (C, T and Agr) is intrinsically substantially more complex than any other in English, we were led to expect that all three might be acquired at roughly the same stage of development." In the first place, the impreciseness of "more or less" and "roughly" makes it hard to decide what belongs to the same stage of development and to judge the accuracy of Radford's prediction. Secondly, even if the markers under investigation here were ordered in terms of relative complexity, it is unlikely that the degree of complexity plays much of a role in determining the order of acquisition. The assumption that more complex elements are harder to learn was not evidenced in the data examined here. In fact, the opposite seems to hold. Among the agreement markers, for example, the third person singular simple present *-s* can be considered to be simpler that the agreement paradigm for *be*. Nonetheless, the *-s* marker appears much later than the forms of *be*.

Saliency is a characteristic that is related to the issue of complexity. As a general rule, complexity seems to be directly proportional to saliency. If we assume that 'the more complex, the harder to learn' then this would contradict the assumption that 'the more salient, the easier to learn'. To give an example, one might think since the agreement paradigm for *be* is more complex than the *-ed* ending, this makes the former harder to learn. However, the agreement paradigm for *be* develops first, in accordance with "the more salient, the easier to learn." On the other hand, although *-ed* is less salient than the forms of *be* (and *do* for that matter), it is acquired first. Therefore, phonological saliency (at least alone) does not seem to be a determinant of order of acquisition.

Another possibility for the earlier acquisition of tense in English might be that it carries more semantic value than agreement. Since English is a non pro-drop language, agreement in itself could be considered semantically redundant, as it does not add any information beyond what the sentential subject already can express. It would be interesting to investigate whether there is a correlation between the pro-drop parameter and acquisition of agreement. In a pro-drop language, the agreement inflection of the verb would be the only

indication of person and number of the omitted subject. In this case, one would expect that the realization of agreement might appear earlier or even precede that of tense.[7]

8.2. Syntax and acquisition order

8.2.1. Evidence for the split-Infl hypothesis

Let us turn now to how the results obtained in this study can be interpreted from a syntactic point of view. Language acquisition is a source of data that can contribute to the understanding of syntactic structure. Specifically, we are interested in finding out whether language acquisition data might reveal something about syntactic structure, or provide evidence for existing hypotheses.

Vainikka (1992) suggests that new syntactic elements generally appear in a bottom-up fashion within the tree. In addition, Clahsen, Eisenbeiss and Vainikka (in press) observe that there is a close connection between the acquisition of syntactic elements and the development of the corresponding syntactic projections. These two observations combined with Pinker's (1984) continuity assumption[8] applied to language acquisition theory would indicate that syntactic structure might be one of the factors that contributes to the developmental sequence of first language acquisition. This could in turn indicate that the order of acquisition reflects the underlying tree structure. Along these lines, based on the present study, one could speculate that tense is acquired before agreement because it is so determined by the phrase structure of English. But, at the same time, this finding can be considered as one of the elements that helps us uncover such underlying phrasal structure.

The results obtained in this study strongly suggest that English-speaking children acquire tense before they acquire agreement. The distinction in the time that these two

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[7] Clahsen and Penke (1991) observed a correlation between the percentage of null subjects and the acquisition of the agreement paradigm in children learning German. According to their study, when children have the full paradigm of subject agreement, there is a decrease in the percentage of empty subjects. They propose that the setting of the pro-drop parameter depends on the acquisition of the syntactic category AGR.

[8] "The null hypothesis in developmental psychology is that the cognitive mechanisms of children and adults are identical" (Pinker 1984, p. 7).

elements are acquired could result from them belonging to two different syntactic categories, instead of being two features of the single category Infl. This observation can be interpreted as a piece of evidence for the split-infl hypothesis, thus supporting Pollock's (1989) and Chomsky's (1991) proposals for the syntactic structure of English, in which AgrP and TP are distinct maximal projections that contain the elements Agr and Tense respectively, as opposed to the more traditional analysis (Chomsky 1986) that assumes that the single category INFL carries both tense and agreement properties.

8.2.2. Cross-linguistic evidence for the split-Infl analysis from acquisition data

The development of functional categories in child language acquisition has been described in terms of the split-Infl hypothesis in several other studies. I will summarize here some of the results obtained for Urdu, Sesotho, German and Spanish.

In a longitudinal study of a child learning Urdu, Saleemi (personal communication) reports that aspect and tense appear first, and the emergence of inflectional elements corresponding to person, number and gender is delayed until the whole IP is in place. Saleemi maintains that the order of acquisition reflects the hierarchical structure of Urdu.

Demuth (1992) proposes an internal structure of IP in Sesotho that contains an Agr_O, an Agr_S and a TP in a configuration that follows Chomsky (1991). Her analyses of the acquisition of early child grammar conforms with these maximal projections.

Meisel (1990) suggests an ordering for the internal structure of IP in German, based on evidence from the order of emergence of number and person agreement and tense inflections. According to Meisel and Müller's (1992) analysis of German child grammar, two functional categories above the VP are necessary to account for their data: T and Agr. In the split-Infl structure proposed by Meisel (1990) and Meisel and Müller (1992),

however, TP dominates AgrP, (as in Pollock 1989), so that "finite and tensed verbs will have to be raised to AgrP before they can be moved to TP" (Meisel and Müller, p. 122)[9].

Turning to evidence from second language acquisition, Eubank (1992) explains his observations of an adult learning a second language (L1 = Spanish, L2 = German) in terms of a split-Infl analysis. The learner's representation of L1, which includes an AgrP dominating a TP, is transferred to L2. During the acquisition of L2, the learner reanalyzes the headedness of the projections (i.e., resets the value of the 'head-first' parameter), maintaining the hierarchical structure. This suggests that the relative order of functional projections in Spanish and German agrees with Chomsky's (1991) syntactic structure for English.

As discussed earlier (section 1.2), the difference between Chomsky's (1991) and Pollock's (1989) analyses lies in the relative ordering of Tense and Agr. Evidence for both proposals can be found in cross-linguistic acquisition data. Meisel's (1990) and Meisel and Müller's (1992) account of German fit best with Pollock's view (however, some theoretical implications of their analysis still require explanation, as mentioned in footnote 9). In contrast, there seems to be evidence in support of the structure proposed by Chomsky (1991) from a number of language acquisition studies about a variety of languages: Urdu

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[9] As pointed out by Poeppel and Wexler (1993), this violates Baker's (1988) Mirror Principle, which states that the order of morphological operations (such as affixation) reflects that of syntactic operations (such as the head-to-head movement that the verb undergoes in order to pick up tense and agreement features and end up in its surface structure position). In German, the inflectional paradigm clearly indicates that tense is attached before subject-agreement. The example below shows that the stem of the verb *sagen* ('to say') is followed by the tense affix and the agreement affix, in that order.

Pron.	present tense	imperfect (past) tense
ich	*sag-Ø-e*	*sag-t-e*
du	*sag-Ø-st*	*sag-t-est*
er/sie	*sag-Ø-t*	*sag-t-et*
wir	*sag-Ø-en*	*sag-t-en*
ihr	*sag-Ø-t*	*sag-t-et*
sie	*sag-Ø-en*	*sag-t-en*

The order of affixes in the agreement paradigm of West Flemish is the same as for German, and Haegeman (1991) presents this argument (among others) to support her proposal for an AgrP that dominates TP.

(Saleemi, personal communication), Sesotho (Demuth 1992), Spanish and German (Eubank 1992), and English (this study).

Whether the TP dominates the AgrP, or vice versa, is an on-going debate that is far from settled, and research in many areas, including language acquisition, can contribute to the understanding of this aspect of syntactic theory. The important point is that both the present study and the others cited in this section provide evidence for the split-infl analysis.

8.3. Three approaches to language acquisition revisited

8.3.1. Is a grammar without functional categories possible?

I have identified the time when tense and agreement first appear in English. One possible corollary of identifying a time when tense and agreement are acquired, is that there is a period during which these elements are not present. In other words, the results of this study seem to suggest that there is a stage without functional categories in the acquisition of English[10].

However, there is evidence suggesting the absence of such a stage for German[11]. It seems impossible to account for children's production without assuming the existence of at least one functional projection even for very early child language (Gawlitzek-Maiwald et.al. 1992; Meisel and Müller 1992; Penner 1992; Verrips and Weissenborn, 1992; Poeppel and Wexler 1993). The same has been observed for other languages as well. Nonetheless, these observations do not necessarily contradict the possibility that children might not have

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[10] An important point needs to be made here. I am determining the time of acquisition based only on production. This does not eliminate the possibility that children know something but do not produce it yet. In other words, the absence of the overt realization of tense or agreement does not necessarily imply that children lack the corresponding 'slot' for the functional head in their phrase structure tree. Whether the 'slot' is available when no lexical item occupies it is an open question: the absence of evidence does not provide evidence of absence.

[11] For example, Poeppel and Wexler (1993) analyze the language of a child learning German, focusing on the word-order phenomena present by age 2;1. According to them, these phenomena imply that by this time the child already has all the functional projections of adult grammar. They refer to this theory as the Full Competence Hypothesis and argue that a grammar without functional categories could never account for their data.

functional categories at some point in development. It could be argued that German children do go through a non-functional stage, which happens to be silent in German[12]; in other words, by the time children start producing language they have already acquired one (or more) functional categories[13].

Hyams (1992) also adheres to the strong continuity approach. But even though she provides evidence for the existence of an I and a C system in early child language, arguing that the data she presents (age 2;0 -2;6) cannot be explained by a grammar without functional projections, in her conclusion she states that "it is possible that children younger than this lack functional categories" (p. 392).

Another explanation for the slower morphological development in English could be formulated in terms of the Stem Parameter proposed by Hyams (1986). This parameter of UG specifies whether bare stems are possible words or not. If they are, then children will use them and acquisition of affixes can be delayed. Otherwise, affixes must be learned sooner, as the language does not allow bare stems to be used as full words.

In short, the question posed in the section title can be answered in more than one way. On the one hand, if we assume the strong continuity hypothesis, then the data from languages in which we find early evidence for functional projections has a straightforward explanation; for other languages, we can say that the full tree is present, but the child does not lexically realize some of the available slots[14]. On the other hand, if we assume that the

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12 Roeper (1992) also refers to a silent stage in the acquisition of German, with respect to the setting of the Head Parameter.

13 Assuming a silent non-functional stage, the question that remains to be answered is: Why is this possible in German but not in English? Pinker's (1984) ideas of lexical learning and semantic bootstrapping could explain this difference. Under his analysis, children use semantic notions to discover grammatical constituents. If in fact the input is responsible for triggering the necessity for functional projections, it is obvious that the rich morphological marking of German provides the child with far more clues than English morphology does. As Meisel (1992) puts it, "English and Swedish children, in the absence of agreement forms of this kind [German-like], apparently need more time to discover the first functional projection" (p. 13). This could account for the cross-linguistic variation that exists in production.

14 Lately, it has been suggested that new syntactic elements generally appear in a bottom-up fashion within the tree (Vainikka 1992). Within a split-Infl analysis, if the bottom-up assumption turned out to be the general case, then it would be odd for functional categories to appear in a different order in different

child does not start with the adult-like tree, the early evidence for functional projections in languages such as German can be explained resorting to the existance of silent stages in development.

8.3.2. **Radford and the maturational approach**

Radford (1990) predicts "that we should expect to find broadly *parallel growth* in the various functional and nonthematic structures which the child acquires" (p. 290). He provides the example of Heather, who at 26 months seems to have all functional projections: IP, CP and DP. However, he fails to give samples of earlier times. Thus, it is not possible to determine from the data whether all functional categories actually developed in parallel or in a gradual fashion. Also, the three Bristol samples that Radford gives belong to a study where children were recorded every three months. A lot can happen to the grammar of children in a three month period, as evidenced in the data examined here. When there is such a gap, it could easily seem as though everything was acquired in parallel.

Radford suggests that longitudinal studies across more than one category are necessary to decide on the issue of parallel development. Under the split-Infl hypothesis (Pollock 1989, Chomsky 1991), the present study spans over two categories, and the data show that development of these two functional categories does not occur in parallel[15].

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languages. Under the strong continuity hypothesis, for those languages where the order of acquisition did not agree with the hierarchical structure of the functional projections, the fact that the tree was not filled in the order expected would require an explanation.

[15] Given the variation among children, acquisition sequence is emphasized here, as opposed to age of acquisition. Radford chooses 26 months as the time when all functional categories are acquired, and supports his claim with data from children aged 26-27 months. As pointed out before, the lack of earlier data makes it impossible to appreciate the transition from what he defines as a non-functional stage to one in which all functional projections are in place.

8.3.3. **The weak continuity approach**

Assuming that the order of acquisition of functional projections mirrors syntactic structure, under the split-infl hypothesis there is still one question that we need to answer: How can we account for an order of acquisition that can vary across languages (as a reflection of the corresponding phrase structure)? The weak continuity approach, which assumes that the tree is built by adding new maximal projections to the structure acquired so far, based on the input and the availability of X' theory, provides the necessary flexibility to accomodate for this cross-linguistic variation, since it would allow for different trees to be built in different languages. Whereas in English AgrP might dominate TP, for other languages the tree constructed in a piecemeal fashion could result in a different dominance relation.

For exposition purposes, let us assume that in English AgrP dominates TP. Within this approach, there are two possible explanations for the relative order of acquisition of these projections:

a) the TP is posited first; later, when agreement is acquired, another maximal projection, AgrP, is added to the existing structure, dominating the TP;

b) an underspecified projection (say IP) is posited when tense comes in. Later, when another element (agreement) competes for the head position of the same projection, IP is split into the maximal projections TP and AgrP, in the right order[16].

In both cases, input helps the child figure out the syntactic structure.

It is interesting to see how these two possibilities can account for cross-linguistic variation. If it turns out that in fact in other languages AgrP and TP are ordered differently, then under (a) these maximal projections could be part of UG, but their relative ordering would be subject to parametric variation. According to (b), the child can expand the phrase structure tree not only by adding maximal projections, but also by specifying features and

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[16] Clahsen (1990) and Clahsen and Penke (1991) also propose the use of underspecified projections to account for the different stages in the development of child German.

relabeling already existing nodes. In this case, what languages would in common is the existence of a functional projection above the VP and dominated by the CP. This characteristic can be captured by means of an underspecified IP in UG[17]. By positing an underspecified IP first and then unveiling its structure with the aid of language specific input, explanation (b) would be in agreement with UG and also with the proposal that the internal structure of IP, more specifically, the dominance relation between the functional projections TP and AgrP, is subject to parametric variation across languages.

9. CONCLUSION

I have examined data from four children acquiring English as their first language in order to determine the developmental sequence of tense and agreement markers. The analysis of the data has shown that tense marking precedes agreement marking. At the same time, these results provide some empirical support for the syntactic structure of the language, in particular, the split-Infl hypothesis. Furthermore, among the three current approaches to language acquisition, the continuity hypotheses seem to lend themselves better to the interpretation of the results, both in their weak and strong versions. Finally, as the present study was limited to English, investigation of other languages will be necessary to test the validity of these findings and their implications for the theories of grammar and language acquisition.

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[17] Roeper (1992) suggests that UG contains the dominance relations 'CP dominates IP' and 'IP dominates VP'.

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